

8 suspected noise-inducing codebook excitation vector is not continuously
9 generated;
10 wherein the input signal comprises a plurality of subframes, the subframes
11 encoded at half-rate or greater, at least a portion of the subframes have a zero or
12 low-level input, and each of the subframes having the zero or low-level input
13 results in a randomized selection of a codebook excitation vector.

REMARKS

This is in response to the Office Action of 07 May 2003. Claims 1-16 are pending in the application, and Claims 1-16 have been rejected.

Claims 1, 5, 9, and 13 have been amended in a non-narrowing manner to correct a grammatical error introduced in the previous amendment.

No new matter has been added.

In view of the amendments above and the remarks below, Applicant respectfully requests reconsideration and further examination.

About The Invention

The present invention relates generally to the field of voice encoding and voice decoding. More particularly, the present invention relates to establishing an input energy threshold for input signals, and randomizing the selection of codebook excitation vectors during the decoding process of full-rate or half-rate encoded frames of speech data wherein the frames include subframes having zero or low-level input. By randomizing the selection of codebook excitation vectors under such circumstances, the generation undesirable audible artifacts is reduced.

Attorney Docket No.

Applicant has previously made this request at least twice. Please update the records of the USPTO to reflect the new attorney docket number for this matter, which is: PHA51214. In other words, change the records to replace the old attorney docket number (i.e., VLSI-3410) with the new attorney docket number (i.e., PHA51214).

Amendments to Claims 1, 5, 9, and 13

Independent Claims 1, 5, 9, and 13 have been amended in a non-narrowing manner to correct a grammatical error introduced in the previous amendment. More particularly, the phrase "using a selection process to such that said suspected noise-inducing codebook excitation vector from is not continuously generated" has been corrected to read "using a selection process such that said suspected noise-inducing codebook excitation vector is not continuously generated", in each of Claims 1, 5, 9, and 13.

Rejections under 35 USC 103(a)

Claims 1-16, have been rejected under 35 USC 103(a) as being unpatentable over Tzeng (US Patent 5,293,449) in view of DeJaco (6,484,138).

For at least the reasons set forth below, Applicant respectfully traverses the rejection of Claims 1-16 under 35 USC 103(a), and requests that these rejections be withdrawn.

Tzeng teaches an analysis-by-synthesis approach to recreating speech in which a linear predictive speech codec arrangement, including a spectrum synthesizer for providing reconstructed speech generation in response to excitation signals; a distortion analyzer for comparing the reconstructed speech with an original speech, and for providing a distortion analysis signal in response to such comparison; and an excitation model circuit receiving and utilizing the

distortion analysis signal in an analysis-by-synthesis operation for determining ones of excitation signals which provide an optimal reconstructed speech.

Essentially, Tzeng discloses a means for determining an encoding scheme by trial and error (i.e., analysis-by-synthesis). The vocoder of Tzeng performs a plurality of speech synthesis operations and takes the results of these synthesis operations and compares them to an original speech sample. During these repeated synthesis operations of Tzeng, various ones of a plurality of stored pulse trains are used to excite a speech synthesizer when a voiced input is received, and various ones of a plurality of Gaussian sequences are used to excite the speech synthesizer when an unvoiced input is received. In fact, Tzeng states, in column 8, that "the Gaussian noise generator **410** outputs each of a plurality of possible Gaussian sequences for use as an excitation signal, with each Gaussian sequence having a different random sequence." In other words the analysis-by-synthesis process disclosed by Tzeng, simply selects a plurality of noise sequences from a codebook, excites a speech synthesizer with each of that plurality of noise sequences, and then evaluates the synthesized speech to determine a best fit. This is different from Applicant's claimed invention. Tzeng discloses using all of the random sequences stored in a codebook to synthesize speech samples and find which one best matches an original speech sample in order to select a certain one of the random sequences for use in encoding a speech sample. However, Applicant's invention randomly selects a single codebook entry when it is determined that the input subframe to be encoded is below a predetermined energy threshold.

The invention defined by Applicant's Claims requires that the each of the subframes having the zero or low-level input, result in a randomized selection of a codebook excitation vector. In this way, similar subframes produce different codebook selections. More particularly, subframes having the zero or low-level input result in the use of randomly selected codebook entries, rather than the same codebook entry each time such a subframe occurs within a frame. Applicant respectfully submits that the invention defined by Applicant's Claims does not appear to be disclosed, suggested, or motivated, by the disclosures of

Tzeng and DeJaco, either singularly or in combination.

For at least the reasons set forth above, Applicants respectfully submit that the rejections of independent Claims 1, 5, 9, and 13 are improper and should be withdrawn. Applicants further submit that the rejections of dependent Claims 2-4, 6-8, 10-12, and 14-16 should also be withdrawn.


Conclusion

All of the rejections in the outstanding Office Action of 07 May 2003 have been responded to, and Applicants respectfully submit that the pending Claims 1-16 are now in condition for allowance.

Attached hereto is a marked-up version of the changes made to the specification by the current amendment. The attached page is captioned "**Version with markings to show changes made**".

Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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Dated: 09 July 2003
Portland, Oregon

Version with markings to show changes made

In the Claims

1 1. (Twice Amended) A computer implemented method of reducing sinusoidal
2 artifact generation in a vocoder, said computer implemented method comprising
3 the steps of:

4 a) receiving a determined input energy threshold value below which a
5 suspected noise-inducing codebook excitation vector is expected to be generated
6 by said vocoder; and

7 b) provided an input signal is received having an energy value lower than
8 said input energy threshold value, using a selection process [to] such that said
9 suspected noise-inducing codebook excitation vector [from] is not continuously
10 generated;

11 wherein the input signal comprises a plurality of subframes, the subframes
12 encoded at half-rate or greater, at least a portion of the subframes have a zero or
13 low-level input, and each of the subframes having the zero or low-level input
14 results in a randomized selection of a codebook excitation vector.

1 5. (Twice Amended) In a computer system having a processor coupled to a bus,
2 a computer readable memory unit coupled to said bus and having stored therein
3 a computer program that when executed by said processor causes said
4 computer system to implement a method of reducing sinusoidal artifact
5 generation in a vocoder, said method comprising the steps of:

6 a) receiving a determined input energy threshold value below which a

7 suspected noise-inducing codebook excitation vector is expected to be generated
8 by said vocoder; and

9 b) provided an input signal is received having an energy value lower than
10 said input energy threshold value, using a selection process [to] such that said
11 suspected noise-inducing codebook excitation vector [from] is not continuously
12 generated;

13 wherein the input signal comprises a plurality of subframes, the subframes
14 encoded at half-rate or greater, at least a portion of the subframes have a zero or
15 low-level input, and each of the subframes having the zero or low-level input
16 results in a randomized selection of a codebook excitation vector.

1 9. (Twice Amended) A computer system comprising:

2 a processor;

3 an address/data bus coupled to said processor;

4 a computer readable memory coupled to communicate with said
5 processor, said processor for performing the vocoder sinusoidal artifact
6 generation reduction steps of:

7 a) receiving a determined input energy threshold value below which a
8 suspected noise-inducing codebook excitation vector is expected to be generated
9 by said vocoder; and

10 b) provided an input signal is received having an energy value lower than
11 said input energy threshold value, using a selection process [to] such that said
12 suspected noise-inducing codebook excitation vector [from] is not continuously

13 generated;
14 wherein the input signal comprises a plurality of subframes, the subframes
15 encoded at half-rate or greater, at least a portion of the subframes have a zero or
16 low-level input, and each of the subframes having the zero or low-level input
17 results in a randomized selection of a codebook excitation vector.

1 13. (Twice Amended) A method of reducing sinusoidal artifact generation in a
2 vocoder, said method comprising the steps of:
3 a) determining an input energy threshold value below which a suspected
4 noise-inducing codebook excitation vector is expected to be generated by said
5 vocoder; and
6 b) provided an input signal is received having an energy value lower than
7 said input energy threshold value, using a selection process [to] such that said
8 suspected noise-inducing codebook excitation vector [from] is not continuously
9 generated;
10 wherein the input signal comprises a plurality of subframes, the subframes
11 encoded at half-rate or greater, at least a portion of the subframes have a zero or
12 low-level input, and each of the subframes having the zero or low-level input
13 results in a randomized selection of a codebook excitation vector.